UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/790,509	03/01/2004	Manish K. Ahluwalia	200315654-1	1055

22879   7590   10/31/2007
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EXAMINER
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ART UNIT	PAPER NUMBER
2185	

MAIL DATE	DELIVERY MODE
10/31/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/790,509	AHLUWALIA, MANISH K.
	Examiner	**Art Unit**	
	Zhuo H. Li	2185	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *30 July 2007*.

2a) ☒ This action is **FINAL**.   2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-23* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-23* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____ .

DETAILED ACTION

Response to Amendment

1.   This Office action is in response to amendment filed 7/30/2007. Accordingly, claims 1, 8-9, 13, 15-19 and 22-23 are amended and claims 1-23 are pending for examination.

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3.   Claims 1-12 and 17-23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding claims 1 and 8, the specification fails to specifically describe register is no longer valid for process use **after the physical address space is released and** before the process has released the virtual address space. Claims 2-7 and 9-12 are also rejected because of depending on claims 1 and 8, respectively, containing the same deficiency.

Regarding claims 17 and 19, the specification fails to specifically describe the virtual address space associated with the process is not available for use **after the mapping of the**

object to physical memory has been removed. Claims 18 and 20-21 are also rejected because

of depending on claims 1 and 8, respectively, containing the same deficiency.

Regarding claims 22-23, the specification fails to specifically describe to register that the

virtual space is not available to the process in a manner after releasing the physical address space

before the process has released the virtual address space.

Claim Rejections - 35 USC § 102

4.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5.   Claims 13-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Browning et al.

(US Pub. 2004/0,064,669 hereinafter Browning).

Regarding claim 13, Browning discloses a computer device (10, figure 1) comprising a

processor (12, figure 1), a memory (16, figure 1) coupled to the processor via a system bus (22,

figure 1), the memory including program instructions for maintaining a virtual memory data

structure as part of a memory management system, i.e., descriptors, ([0037]-[0038] and [0041]-

[0044]), and means for unmapping a virtual address space, i.e., set invalid, for a process in a

manner which does not violate semantics for an operating system of the computing device when

a removable memory mapplable device associated with the process is logically disconnected

((([0027], [0061]-[0063], and figure 9).

Regarding claim 14, Browning discloses the program instructions execute to dereference

the virtual address space for the process ([0027], [0061]-[0063], and figure 9).

Regarding claim 15, Brown discloses the means for unmapping the virtual address space

includes program instructions, which execute to maintain a representation of an object associated

with the process in the virtual memory data structure of the process ([0034], [0037]-[0038] and

[0043] –[0044]).

Regarding claim 16, Browning discloses the means for unmapping the virtual address

space includes program instructions which execute to remove a mapping of the object to physical

memory ([0059]-[0063] and figure 9).

Claim Rejections - 35 USC § 103

6.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7.   Claim 1-12 and 17-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Browning et al. (US Pub. 2004/0,064,669 hereinafter Browning) in view of Arimilli et al. (US

PAT. 6,907,494 hereinafter Arimilli).

Regarding claim 1, Browning discloses a computer device (10, figure 1) comprising a

processor (12, figure 1), a memory (16, figure 1) coupled to the processor via the system bus (22,

figure 1 and [0036]), and program instructions, i.e., kernel, provided to the memory and

executable by the processor to track a virtual address space for a process associated with a device

connected to the computer device ([0029]), release a physical address space associated with the

virtual address space when the device has a connection removed from the computer device, and

register that the virtual address space, previously available to the process, is no longer valid for

process use before the process has released the virtual address space ([0027], [0061]-[0063], and

figure 9). Browning differs from the claimed invention in not specifically teaching to register

that the virtual address space is no longer valid for process use after the physical address space is

released. However, Arimilli teaches a method of managing virtualized physical memory in a

memory controller comprising the steps of releasing a physical address space (col. 7 lines 21-25,

i.e., remove a memory modules in the system) and register that the virtual address space is no

longer valid for process use after the physical address space is released (col. 7 lines 43-57) in

order to quickly and efficiently implement dynamic reconfiguration of physical memory (col. 2

lines 17-21). Therefore, it would have been obvious to a person of ordinary skill in the art at the

time the invention was made to modify Browning in having the steps of registering that the

virtual address space after the physical address space is released, as per teaching of Arimilli, in

order to quickly and efficiently implement dynamic reconfiguration of physical memory.

Regarding claims 2-3, Browning discloses the device includes a device, which can be

mapped to memory, and the virtual address space includes an input/output space (Pp[0054]).

Regarding claim 4, Brown discloses the program instructions are part of a memory

management system, which includes a virtual memory data structure associated with the process

([0026], [0038], and [0043]-[0044]).

Regarding claim 5, Browning discloses the program instructions execute to register the

virtual address space is no longer valid for process use in the virtual memory data structure

associated with the process ([0031]-[0034], [0050], and [0061]-[0063]).

Regarding claim 6, Browning discloses the program instructions execute to allocate the

virtual address space when the process requests physical memory ([0048]-[0049]).

Regarding claim 7, Browning discloses the program instructions execute to register that

the virtual address space is available for use when the process releases the virtual address space

([0032]-[0033], [0041], and [0059]-[0060]).

Regarding claim 8, Browning discloses a computing device (10, figure 1) comprising a

processor (12, figure 1), a random access memory (16, figure 1) coupled to the processor via the

system bus (22, figure 1), and program instructions, i.e., kernel, provide to the memory and

executable by the processor, the program instructions are part of a memory management system

(Pp[0037]-[0038] and Pp[0026]-[0029]) to deference a virtual address space for a process

associated with a removable memory mappable device connected to the computer system,

release a physical address space associated with the virtual address space when the device

associated with the process is logically disconnected ([0027], [0061]-[0063], and figure 9), and

register in a virtual memory data structure of the memory management system that the virtual

address space is no longer available to the process when the process has not yet released the

virtual address space ([0062]-[0063]). Browning differs from the claimed invention in not

specifically teaching to register in a virtual memory data structure of the memory management

system that the virtual space is no longer available to the process after the physical address space

is released. However, Arimilli teaches a method of managing virtualized physical memory in a

memory controller comprising the steps of releasing a physical address space (col. 7 lines 21-25,

i.e., remove a memory modules in the system) and register that the virtual address space is no

longer valid for process use after the physical address space is released (col. 7 lines 43-57) in

order to quickly and efficiently implement dynamic reconfiguration of physical memory (col. 2

lines 17-21). Therefore, it would have been obvious to a person of ordinary skill in the art at the

time the invention was made to modify Browning in having the steps of registering in a virtual

memory data structure of the memory management system that the virtual space is no longer

available to the process after the physical address space is released, as per teaching of Arimilli, in

order to quickly and efficiently implement dynamic reconfiguration of physical memory.

Regarding claim 9, Browning discloses the program instructions, i.e., kernel, execute to

unmap the virtual address space in a manner which do not violate semantics for an operating

system of the computing device ([0062] and [0041]-[0047]).

Regarding claim 10, Browning discloses the computer system (10, figure 1) for

invalidating specified pre-translations of virtual to physical addresses by kernel, i.e., operating

system, to perform executing in the computer device and memory operation. Browning differs

from the claimed invention in not specifically teaches the operating system is selected from the

group of a Unix operating system and a Linux operating system. However, it is old and

notoriously well know in the art that kernel is a core of an operating system, a portion of the

system that manages memory, files, and peripheral devices, maintains the time and data,

launches applications, and allocates system resources, as defined by *Microsoft Computer dictionary Fifth edition*, furthermore, kernel is defined as an operating system of the essential part of Unix or other operating systems, such as Linus operating system in *On-line Computing Dictionary* (http://www.instantweb.com/foldoc/foldoc.cgi?query=kernel&action=Search). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the operating system in the computer system of Browning is selected from the group of a Unix operating system and a Linux operating system, because it improves and enhances the flexibility in the computer system.

Regarding claims 11-12, Browning discloses the program instructions execute to allow the process to unmap the virtual address space subsequent to the release of the physical address space and to indicate an operation as failed if the process attempts to perform the operation subsequent to registering that the virtual address space is no longer valid for process use ([0044]-[0048]).

Regarding claims 17-18, Browning discloses the means for unmapping the virtual address space includes program instructions which execute to register in the virtual memory data structure of the process that the virtual address space associated with the process is not available for use ([0044]-[0048]), and the program instructions execute to set a bit in the region of the virtual memory data structure to indicate that the virtual address space is not available for use (figure 3B and [0044]-[0048]). Browning differs from the claimed invention in not specifically teaching to register the virtual space associated with the process is not available for use after the mapping of the object to physical memory has been removed. However, Arimilli teaches a method of managing virtualized physical memory in a memory controller comprising the steps of

releasing a physical address space (col. 7 lines 21-25, i.e., remove a memory modules in the system) and register that the virtual address space is no longer valid for process use after the physical address space is released (col. 7 lines 43-57) in order to quickly and efficiently implement dynamic reconfiguration of physical memory (col. 2 lines 17-21). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Browning in having to register the virtual space associated with the process is not available for use after the mapping of the object to physical memory has been removed, as per teaching of Arimilli, in order to quickly and efficiently implement dynamic reconfiguration of physical memory.

Regarding claim 19, Browning discloses a method for memory management on a computer device (10, figure 1) comprising dereferencing a memory address for a process, i.e., memory removal process, associated with a removable memory mappable device (figure 9), mapping a representation, i.e., descriptor, of an object associated with he process in a virtual memory data structure associated with the process ([0038], [0043]-[0044]), removing the object from physical memory when the device is logically disconnected from the computing device ([0061]), and providing an indication in the virtual memory data structure that a virtual address space is no longer available for use by the process without removing the representation of the object from the virtual memory data structure ([0029]-[0034], [0047] and [0061]-[0063]). Browning differs from the claimed invention in not specifically teaching that the virtual address space is no longer available for use by the process after removing the object from the physical memory. However, Arimilli teaches a method of managing virtualized physical memory in a memory controller comprising the steps of releasing a physical address space (col. 7 lines 21-25,

i.e., remove a memory modules in the system) and register that the virtual address space is no

longer valid for process use after the physical address space is released (col. 7 lines 43-57) in

order to quickly and efficiently implement dynamic reconfiguration of physical memory (col. 2

lines 17-21). Therefore, it would have been obvious to a person of ordinary skill in the art at the

time the invention was made to modify Browning in having that the virtual address space is no

longer available for use by the process after removing the object from the physical memory, as

per teaching of Arimilli, in order to quickly and efficiently implement dynamic reconfiguration

of physical memory.

Regarding claims 20-21, the limitations of the claims are rejected as the same reasons set

forth in claims 11-12.

Regarding claim 22, Browning discloses a method for memory management comprising

tracking a virtual address space for a process associated with a removable, memory mappable

device connected to a computer device (10, figure 1) and ([0029]), releasing a physical address

space when the device has a logical connection removed from the computing device, and upon

releasing the physical address space before the process has released the virtual address space

([0027], [0061]-[0063], and figure 9), registering that the virtual address space is not available,

i.e., invalid, to the process in a manner which does not violate semantics of an operating system

([0062]-[0063]). Browning differs from the claimed invention in not specifically teaching to

register that the virtual address space is not available after releasing the physical address space. .

However, Arimilli teaches a method of managing virtualized physical memory in a memory

controller comprising the steps of releasing a physical address space (col. 7 lines 21-25, i.e.,

remove a memory modules in the system) and register that the virtual address space is no longer

valid for process use after the physical address space is released (col. 7 lines 43-57) in order to

quickly and efficiently implement dynamic reconfiguration of physical memory (col. 2 lines 17-

21). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the

invention was made to modify Browning in having the steps of registering that the virtual

address space is not available after releasing the physical address space, as per teaching of

Arimilli, in order to quickly and efficiently implement dynamic reconfiguration of physical

memory.

Regarding claim 23, the limitations of the claim are rejected as the same reasons set forth

in claims 19 and 22.

Response to Arguments

8.   Applicant's arguments with respect to claims 1-12 and 17-23 have been considered but

are moot in view of the new ground(s) of rejection.

9.   Applicant's arguments filed 7/30/2007 have been fully considered but they are not

persuasive.

In response to applicant's argument that Browning reference does not contain any

mention of unmapping in relation to the semantics of an operating system or in relation to

removable memory mappable devices, it is noted that Browning clearly teaches means for

unmapping a virtual address space, i.e., set invalid, for a process in a manner which does not

violate semantics for an operating system of the computing device when a removable memory

mapplable device associated with the process is logically disconnected (((([0027], [0061]-[0063],

and figure 9, i.e., the detailed process of removing a real page of memory). Thus, Browning

teaches the unduly broad claimed limitations.

Conclusion

10.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure.

        O'Brien et al. (US PAT. 6,038,639) discloses a data file storage system for snapshot copy

operation (abstract).

        Belsan et al. (US PAT. 5,193,184) discloses the deleted dataset space release system

providing facilities in a dynamically mapping virtual memory data storage subsystem to

immediately release the physical space occupied by a deleted dataset (abstract).

11.   Applicant's amendment necessitated the new ground(s) of rejection presented in this

Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

        A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this

final action.

12.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Zhuo H. Li whose telephone number is 571-272-4183. The

examiner can normally be reached on Mon - Fri 10:00am - 6:30pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Sanjiv Shah can be reached on 571-272-4098. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or access to the automated

information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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